

R E M A R K S

Applicant's attorneys have tried again to address the 35 U.S.C. §112 issues seriously and sincerely, and respectfully believe the Office is again mistakenly rejecting claims 41, 43, and 48 (reciting a toughness parameter) on the grounds that they are indefinite. It is our sincere belief that rather than being based on indefiniteness, the rejection is based on the assertion that the toughness values are not taught by the prior art. Regardless of whether this is true, the issue is only incident to the overall view of the invention, to wit: the prior art fails to be a relevant teaching of this invention.

This invention as now claimed focuses on the fact that the underfill compositions are used in flip-chip-attach (FCA) encapsulation, which can be applied to both ceramic and organic substrates. In use of organic substrate materials, the specification on page 2, first paragraph, specifically states that the coefficient of thermal expansion is approximately three times that of ceramic materials (i.e., 20 ppm/degree C. vs. 6.5 ppm/degree C.). This requires that the encapsulant be tougher in withstanding thermal cycling.

TANG et al. do not state anywhere in the patent text that they are using their compositions for flip-chip-attach encapsulation. Furthermore, TANG et al. never teach the toughness values taught by Applicant, which are necessary for use with organic substrates. Not only does Applicant increase the toughness, but the specification also teaches (page 3, second paragraph) that increase of toughness (up to 50%) is also achieved without excessive change to the viscosity and glass transition temperature,  $T_g$ .

TANG et al., USUI et al., and HANYU et al. do not employ any of these teachings. The invention as claimed is not anticipated (35 U.S.C. §102), nor is it obvious, nor unpatentable over TANG et al., USUI et al., and HANYU et al.

Furthermore, nowhere in any of these references is it taught that the compositions comprise a fine powder as structurally claimed by this invention. HANYU et al. do not silica fill, and therefore the reference is not relevant under 35 U.S.C. §102.

In paragraph 3, page 3 of the Office Action, these relevant hardness values are given what appears to be a contrived rejection, wherein the Office states that these values are drawn to the composition and not to the particle itself; therefore, the skilled artisan would not know how to measure the toughness. This statement is incorrect because the composition is a fine powder whose particles are being measured. The Office explanation, with all due respect, is sophistry. The standards for testing toughness are well known in the industry. To suggest that the assignee, IBM, used a method that could not be duplicated is merely supposition, as the Office does not have technical reasons for rejecting the values claimed by Applicant. More than that, with all due respect, the rejection disguises the fact that the references to TANG et al., USUI et al., and HANYU et al. do not teach the invention as claimed, either structurally or functionally.

As previously stated, the assignee, IBM, is a world-class company and its laboratories adhere to exacting engineering standards. All tests are run in accordance with engineering society standards. It is sincerely and respectfully believed that Applicant should be given the same respect the Office gives

other applicants and patentees. In addition, unless there is anything in the specification leading one to an adverse conclusion, Applicant's statements with regard to toughness parameters should be given proper weight and respect.

Therefore, attorneys for Applicant traverse the objections and rejections based upon 35 U.S.C. §§112, 102, and 103.

The Office admits, for example, that the HANYU et al. reference does not teach the purpose of the invention. With all due respect, given this situation, it is not proper to include this reference either under 35 U.S.C. §102 or as a sole reference under 35 U.S.C. §103.

With regard to the rejection based on the TANG et al. reference, please note that TANG et al. use a cross-linked copolymer for the elastomeric core. TANG et al. are forced to cross-link the core to improve toughness, which reduces the  $T_g$ . This is directly opposite the teaching of Applicant's invention, which maintains toughness without significantly changing thermal coefficients.

As stated in the specification, page 3, second paragraph, "The present invention comprises materials that increase the toughness of the encapsulant up to fifty percent, without excessive change to the viscosity and glass transition temperature,  $T_g$ ." This is accomplished without resorting to cross-linking.

With respect to the rejections under 35 U.S.C. §112, Applicant specifically makes reference to page 2, first numbered paragraph of the Office Action, in which claims 35, 36, 54, 56, and 66 were held to have no support in the specification. Applicant draws the attention of the Office to the top of page 4 of the specification, which teaches the materials recited in claims 35 and 66. Page 7 teaches the claimed materials and percentages recited in claim 36. The support for claim 54 has already been recited above (page 2, first paragraph).

With respect to page 2, second numbered paragraph of the Office Action (claims 41 and 42 through 51), this issue has already been addressed above (see page 11, second paragraph of the specification); and the rejection of claims 41, 43, and 48

have been obviated by the recitations found on pages 4 and 5 of the specification.

Page 3, third numbered paragraph of the Office Action has already been addressed.

Page 3, fourth numbered paragraph of the Office Action, rejects claims 37, 54, 57, 58, 67, and 68 for not limiting previous claims from which they are dependent. These claims recite detailed composition substances in percentage weight, which are clearly limiting recitations to the substances being recited in their dependent method claims.

With respect to numbered paragraphs 8 and 9 of the Office Action, pages 4 and 5, respectively, the TANG et al. reference does not teach the required hardness specified by Applicant. The reference does not have the same purpose as the invention. A sole reference not having the same purpose is improperly applied under 35 U.S.C. §§102 and 103.

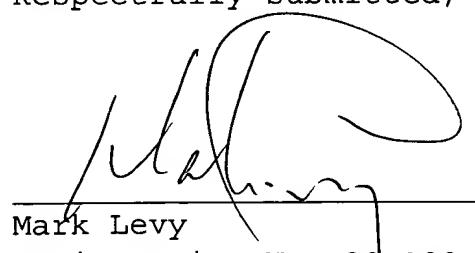
With respect to page 5, numbered paragraphs 10 through 12 of the Office Action, the USUI et al. reference cannot be used

in the sense of 35 U.S.C. §102, because the encapsulant is used for plastic substrates rather than organic substrates and is not used in FCA applications. The USUI et al. reference does not teach the toughness required for FCA applications.

With respect to numbered paragraphs 13, 14, and 15, page 6, of the Office Action, the HANYU et al. reference cannot be a valid reference for failure to teach the purposes of the invention as admitted by the Office, and for failure to structurally show application for FCA, such as toughness and thermal cycling consistent therewith.

In view of the foregoing remarks, Applicant respectfully requests claims 31 through 70 be allowed and the application be passed to issue.

Respectfully submitted,

  
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